

**Equity Linked Compensation and  
Risk Taking Behaviour of the Executives:  
Evidence form REITS**

**by**

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B.Sc., University of Tehran, 2007

Research Project Submitted In Partial Fulfillment of the  
Requirements for the Degree of  
Master of Science

in the

Segal Graduate School of Business  
Faculty of Business Administration

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**SIMON FRASER UNIVERSITY**

**Fall 2014**

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## **Abstract**

In this, based on prior literature, I hypothesize a link between equity-linked compensation and risk of the REIT firms. This dissertation adds to the literature as unlike previous studies, the direct link between executive equity-linked compensation and risk for REITS is examined. I examine the proposed relation for 100 firms with SPINDEX 4040 and 20 S&P500 real estate firms. Contrary to previous studies, I did not find a strong link between risk variables and executive equity-linked compensation.

Keywords: CEO; CFO; equity-linked compensation; enterprise risk management; corporate governance; Real Estate Investment Trust REIT

## **Dedication**

This project is dedicated to my parents  
for supporting me and always encouraging me for education.

## **Acknowledgements**

I would like to acknowledge the support and advice of my senior supervisor, Andrey Pavlov, my second reader, Steve Adang in the completion of this project.

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## 1. Introduction:

When a party is elected to act in the interest of another party, principal-agent problems or agency problems arise. Agency problems, especially in the light of financial crisis in the late 2000s, are a continuous concern for corporations. From agency perspective, stock awards are used to tie managers' compensation to the performance of the company. The CEO whose compensation relies on company's performance will be less willing to take risk than a diversified shareholder. In order to address the issue, equity based compensation such as option awards are used to reduce conflict of interest between managers and shareholders. The question is, are these remuneration packages effective in aligning interests, and if so, to what extent?

Researchers have examined the effectiveness of these compensation schemes in increasing shareholders' value by studying structure of the incentive packages and examining the relation between different firm performance measures and value and structure of the compensation. In literature review section, this dissertation will give a summary of the findings of previous literature on the link between pay and performance.

More specifically, I will review the literature on the link between executive payout and firm risk-taking. After global financial meltdown following subprime mortgage crisis, regulatory bodies have focused on contingent compensation made to executives. This was due the belief that these compensation packages encouraged managers to deliberately take excessive risk in the expense of overall economy; e.g. since options are designed to eliminate downside risk, when a high proportion of executive's pay comes from option grants, the executive may tend to make the firm more risky in order to increase the value of her compensation. Building on this, I examine the relation between executive compensation, especially equity-linked compensation, and riskiness of the firm in US REITS - Real Estate Investment Trusts.

Two measures are used to measure firm risk, stock volatility and firm historical 99 percent value at risk both calculated annually. The Value-at-Risk (VaR) is especially relevant to this thesis because it only focuses on downside of return distribution and it has been adopted by regulators.

I examine the compensation-risk relation in Real Estate Investment Trusts. REIT is a company that owns, and in most cases operates, income-producing real estate. REIT is a highly regulated industry complying with U.S. Securities and Exchange Commission. REITS need several conditions to maintain their federal tax-exempt status. They must distribute at least 90% of their taxable income to their shareholders in the form of dividends, must have at least 100 or more shareholders, have no more than



50% of the shares held by five or fewer individuals during the last half of each taxable year, must not be a financial institution or an insurance company, have at least 75% of its total assets invested in real estate, derive at least 75% of its gross income from rents or mortgage interests. REITS are highly regulated funds that need to follow strict regulation to maintain their tax requirement; this will limit the means by which a manager can take risk as the only way for an executive in REITS to increase risk is through equity, as other means such as R&D and operational risk tools are not available.

My hypothesis is that there is a positive relation between REITS riskiness and executive equity-linked compensation (ELC) where ELC is any compensation in the form of stock grants or option grants. Also, especially when higher proportion of ELC compensation comes from option grants, I expect to see a positive relation between ELC and risk. The case for REITS is especially interesting because equity is the only means through which REITS executives can increase risk and therefore it should be interesting to examine the “pay-risk” relation in real estate investment trusts.

This research especially adds to the literature in that few of the previous studies have focused on the direct relation between REIT equity risk and executive equity linked compensation. Previous literature in REITS have mostly been interested in pay-performance relation and have only considered risk as one of the many factors in determining executive compensation.

The remainder of this dissertation is organized as follows. Section 2 reviews the literature. Section 3 covers data sources and variables used. Section 4 covers data analysis and results and section 5 concludes.

## **2. Literature Review and Hypothesis Development**

There is extensive body of research on the subject of agency problems- conflict of interest between people responsible for managing the company and company stockholders. Agency problems arise because ownership and control of a corporation are separated from each other. According to Jensen and Meckling (1976), the less the managers own the company, the more agency costs the company will incur.

Hermalin and Weisbach (1998) argue that executive compensation, in their case CEO compensation, is a result of negotiation between CEO and board of directors such that as the CEO becomes more powerful or the board of directors becomes less independent, the more likely that the CEO demands more income in the form of cash salary and bonus rather than equity linked compensation such as stock or option grants. Bebchuk and Jesse M. Fried (2003) further argue that

managerial power and rent extraction have an important influence on the design of compensation schemes.

While it's impossible to completely eliminate agency costs, board of directors try to motivate managers through means such as performance based compensation which tie managers' compensation with company's overall performance and hence reduce the conflict of interest between executives and shareholders. Bryan, Hwang, and Lilien (2000) argue that stock options not only align shareholders' interest with those of managers but it also encourages risk-averse managers to invest in riskier projects that they would otherwise do.

There is extensive literature on the relation between managers' compensation and company performance and researchers have used many different approaches to examine "pay-performance" relation. Firm performance is usually measured by return on equity, return on assets, stock market returns, Tobin's q or combination of these and compensation usually includes any combination of salary, bonus, and stock and option grants.

Prior research shows a mixed result on the connection between pay and performance. Some have found a positive "pay-performance" relation Murphy (1985), and some have found weak or insignificant "pay-performance" relation (Jensen and Murphy, 1990, Benmelech, Kandel, and Veronesi, 2010) and yet some others have even found a negative relation (Pennathur, Gilley, and Shelor (2005), Armstrong, Jagolinzer and Larcker, 2010).

Mehran (1995) has found that Tobin's Q and ROA is positively related to equity linked compensation and top management's ownership. Core, Holthausen, and Larcker (1999) find positive relation between total, cash, and salary compensation on one hand and firm size, investment opportunities, stock returns, and standard deviation ROA on the other. Ryan and Wiggins (2000) find positive relation between equity-based awards and investment growth opportunities, firm size, institutional holdings, percentage of outsiders in the board, and leverage respectively. Stammerjohan (2004) finds that Stock options are positively related to subsequent performance (t+1, t+3, t+5). (Noguera, 2007)

### **Pay vs. Risk**

Stock options are introduced as compensation to managers to induce them to take more risk; Grant, Markarian, and Parbonetti (2009). The behavioral agency model predicts that managers have less incentive to take risk than a diversified shareholder and therefore, managers might avoid some risky but

positive NPV investment opportunities. Stock awards as compensation would exacerbate this as the manager wouldn't want to make his wealth more risky. Managers try to reduce earnings and stock price volatility as volatility adversely affects their tenure and personal wealth. Because options eliminate downside risk, compensation in the form of option awards is used to motivate managers to take more risk.

From the perspective of risk-taking incentives embedded in Option grants, studies have established a positive relation with CEO risk-taking behavior. Coles, Naveen, and Naveen (2006) provide empirical evidence of a strong causal relation between managerial compensation and investment policy, debt policy and firm risk. Rajgopal and Shevlin (2002) find that executive stock options provide managers with incentives to mitigate risk-related incentive problems. According to Rajgopal et al. (2004) stock option compensation appear to be associated with increased risk taking. Shi (2004) separates risk into industry- and firm-specific risk and finds that risk-taking incentives is negatively correlated with industry risk but positively with firm-specific risk. He also finds that the more risk taking incentive the manager has, the more diverse a firm's investing activity will be.

In the aftermath of the financial crisis of 2008-2009, many believe that executive pay arrangements might have encouraged excessive risk-taking and that fixing those arrangements will be important in preventing similar excesses in the future (Bebchuk, Cohen and Spamann ,2010). Bhagat and Bolton (2014) study the executive compensation structure in 14 of the largest U.S. financial institutions during 2000–2008 and find that incentives generated by executive compensation programs are correlated with excessive risk-taking by banks. These findings are in agreement with my hypothesis that there should be positive link between risk executive compensation and risk.

### **Executive compensation in Real Estate Investment Funds - REITS**

Although highly regulated, significant proportion of compensation in REITS comes from equity linked compensation and for this reason different researchers have examined the link between REIT firm performance and executive compensation. Hardin (1998) finds a positive relation between cash compensation and REIT firm size and senior executive stock ownership. Chopin, Dickens and Sehlor (1995) find positive relation between REIT revenue and size and CEO compensation. Scott, Anderson, and Loviscek (2001) examine the explanatory power the market-based performance measures have on REIT executives' total incentive compensation and find positive relation between performance compensation and firm size and REIT stock return.

Pennathur, Gilley, and Shelor (2005) examine the relation between REIT CEO stock-based compensation and performance measures across different real estate industries and find negative

relation between option awards and REIT stock performance and size. They also found Positive relation between option awards and stock returns volatility and negative relation between option awards and firm performance. Feng, Ghosh, and Sirmans (2007) find a positive relation between REIT performance and equity based compensation.

In a more recent study, Griffith, Najand, and Weeks (2011) examine the relation between CEO compensation and CEO power, firm size, firm performance, firm risk and CEO risk aversion. They find that performance and size do not influence CEO salary while CEO specific characteristics such as tenure, title, ownership and age have significant effects. They also find no relation between bonus and risk, CEO power or size. They find that option awards are affected by performance and CEO power.

Despite the abundance of literature on the link between pay and various other variables including firm performance, there has not been much research done on the direct relation between risk and equity based compensation, especially in REITS. This paper adds to the literature as it examines the direct relation between REITS firm risk and executive compensations. I also extend the literature by using value at risk as an additional measurement of risk, beside volatility.

### 3. Methodology and Data

As mentioned in previous section, I hypothesize a positive relation between REITS equity-linked compensation and firm risk. Linear regression is used to model this hypothesis. Initially, Risk is estimated by a single predictor, which is proportion of equity-linked compensation, on the right hand side. This hypothesis is modeled as:

$$Risk = \beta_0 + \beta_1 \times (Equity\ Linked\ Compensation\ Proportions)$$

As discussed in the literature review, researchers have argued that the reason for including options as form of incentive for executives is to induce them to take more risk. Therefore I am interested to model risk and both components of equity-linked compensation at the same time to observe any difference from single predictor regression. Therefore, in the next stage, risk is modeled by both stock grants and option grants proportions simultaneously in a multiple linear regression.

$$Risk = \beta_0 + \beta_1 \times (Stock\ Grants\ Proportion) + \beta_2 \times (Option\ Grants\ Proportion)$$

Two variables are used to represent risk:

Risk:

Annual Volatility = Standard deviation of daily returns multiplied by squared root of number of trading days

Historical 99 percent Value at Risk = Calculated empirically by sorting the daily return values and taking the first percentage.

Predictor variables are either of the three below

Equity-Linked Compensation:

Stock Grant Proportion = Proportion of the total compensation that comes from Stock Grants

Option Grant Proportion = Proportion of the total compensation that comes from Option Grants

Total ELC Proportion = Proportion of the total compensation that comes from Equity Linked Compensation

**Data Sample**

Executive compensation data was retrieved from the Wharton Research Data Services' (WRDS') CompuStat Execucomp database. Each year CompuStat Execucomp database collects compensation data for top five executives within each firm. For the purpose of this study only observations marked with CEO or CFO flags are selected. Within CompuStat Execucomp, I initially narrowed the compensation data to companies with SPINDEX 4040 representing real estate industry group. The resulting data contained compensation for CEOs and CFOs for 95 real estate companies. I eliminated the companies with fragmented compensation data and eventually selected 83 companies with SPINDEX 4040.

To give my analysis more focus, I reduced the sample of companies to current members of S&P 500 Real Estate Investment Trusts Industry Index- "S5REITS", a representative of the US REITS Market. I obtained tickers for S5REITS index from Bloomberg and used the list to refine my results from CompuStat Execucomp.

I choose the 2006-2012 as the range for my executive compensation data. This is due the fact that in 2006 new disclosure requirements required greater transparency of chief financial officer compensation as well as equity linked compensation.

For each company I selected the following information:

- Company Name
- Company ID Number
- Ticker Symbol

For each executive I included the following data:

- EXEC\_FULLNAME: full name of the executive
- Company ID Number : the GVKEY assigned by WRDS

For compensation data out of 69 data type available I selected the following information:

- YEAR : the year that the compensation was recorded
- CEOANN Flag indicating CEO
- CFOANN - Flag Indicating CFO

Compensation data:

- SALARY : total salary paid during the year
- BONUS : total bonus paid during the year
- STOCK AWARDS :

Annual value of stock awards to the executive calculated as per FAS 123R (\$)

- OPTION\_AWARDS\_BLK\_VALUE :

Annual value of options granted to the executive calculated in Compustat following Black Scholes

- PENSION\_CHG :

Annual change in pension value owned to the executive

- ALLOTHTOT -- All Other Total

After organizing the data, I had compensation data for CEO, CFO, and sum of the compensation for CFO and CFO in separate sheets.

I defined my variables according to my model, as follows:

ANN\_COMP<sub>*i,t,exec.*</sub>: total annual compensation

*i* indicating firm,

*t* indicating year,

*exec.* indicating executive type CEO or CFO

ANN\_COMP<sub>*i,t,exec*</sub> = SALARY + BONUS + OPTION\_AWARDS\_BLK\_VALUE +

STOCK\_AWARDS + PENSION\_CHG + ALLOTHTOT

The option grant proportion - OG Prop , stock award proportion - SG Prop, and total equity linked proportion-ELC Prop to total annual compensation value - ANN\_COMP were defined as:

OG Prop<sub>*i,t,exec*</sub> = (OPTION\_AWARDS\_BLK\_VALUE<sub>*i,t,exec*</sub>) / ANN\_COMP<sub>*i,t,exec*</sub>

Proportion of total compensation that comes from option grants

SG Prop<sub>*i,t,exec*</sub> = (STOCK\_AWARDS<sub>*i,t,exec*</sub>) / ANN\_COMP<sub>*i,t,exec*</sub>

Proportion of total compensation that comes from stock grants

ELC Prop<sub>*i,t,exec*</sub> = (OPTION\_AWARDS\_BLK\_VALUE + STOCK\_AWARDS) / ANN\_COMP<sub>*i,t,exec*</sub>

Proportion of total compensation that comes from ELC

I wrote a MATLAB code to read the ticker and year and obtain daily stock prices from Yahoo Finance and calculate the standard deviation of daily returns and annually scale it. I also wrote a function to calculate 99 percent value at risk in my code. The MATLAB code automatically updated the data set. Now each company had data for standard deviation and value at risk.

## Modeling

Putting my variables in my hypothesized model, following regression models are resulted.

$$\begin{aligned}(\text{Annual VaR99 OR Volatility})_{Year,Firm,Executive}, &= \beta_0 + \beta_1 \times (\text{OG Prop})_{Year,Firm,Executive} \\ &= \beta_0 + \beta_1 \times (\text{SG Prop})_{Year,Firm,Executive} \\ &= \beta_0 + \beta_1 \times (\text{ELC Prop})_{Year,Firm,Executive}\end{aligned}$$

Equations above evaluate the relation between REITS annual risk and annual option grants proportion, stock grant proportion and overall equity linked proportion respectively.

Multilinear regression model is as follows:

$$\begin{aligned}(\text{Annual VaR99 OR Volatility})_{Year,Firm,Executive}, & \\ &= \beta_0 + \\ &\beta_1 \times (\text{OG Prop})_{Year,Firm,Executive} + \\ &\beta_2 \times (\text{SG Prop})_{Year,Firm,Executive}\end{aligned}$$

Equation above examines the simultaneous predicting power option grants and stock grants have on firm risk - 99 per cent value at risk and standard deviation.



## 4. Data Analysis

SPINDEX 4040 :2006-2012

The summary of the result of my data analysis for 83 real estate firm with SINDEX4040 comes below.

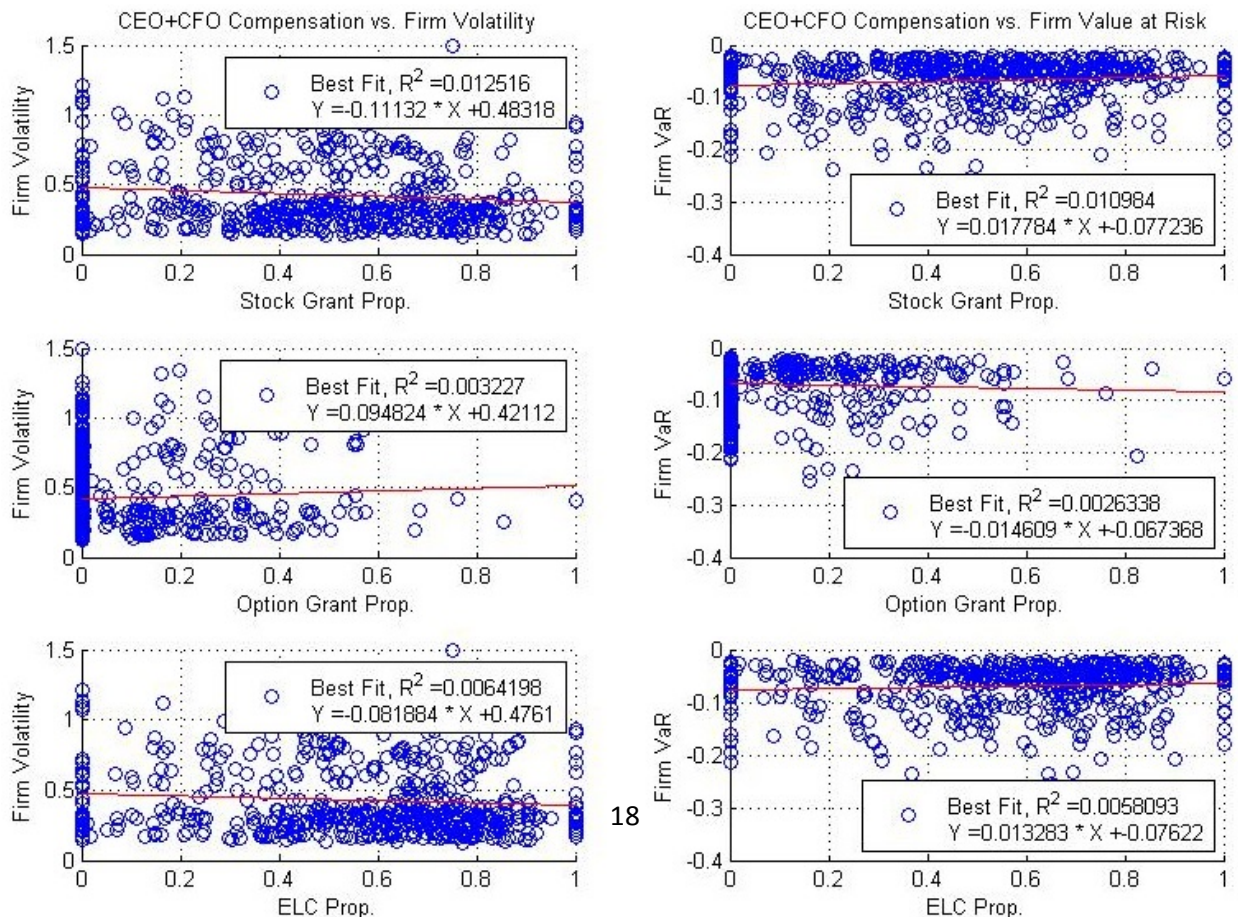
Index	Executive	Output variable	Regressors	[beta0 beta1]	R <sup>2</sup>
SPINDEX4040	CEO	Volatility	SG Proportion	[0.476 0.099]	.01186
			OG Proportion	[0.419 0.096]	0.00399
			ELC Proportion	[0.465 0.066]	0.005
		Value at Risk	SG Proportion	[0.076 0.016]	0.0103
			OG Proportion	[0.067 0.014]	0.0029
			ELC Proportion	[0.074 0.0109]	0.0048
	CFO	Volatility	SG Proportion	[0.472 -0.097]	0.0089
			OG Proportion	[0.4234 0.077]	0.0017
			ELC Proportion	[0.469 0.0781]	0.0054
		Value at Risk	SG Proportion	[0.075 0.0153]	0.0076
			OG Proportion	[0.0677 -0.012]	0.0014
			ELC Proportion	[0.075 -0.0124]	0.0047
CEO & CFO	Volatility	SG Proportion	[0.47 0.097]	0.0103	
		OG Proportion	[0.42 0.086]	0.0026	
		ELC Proportion	[0.466 -0.0707]	0.00526	
	Value at Risk	SG Proportion	[0.0756 0.0154]	0.00892	

	CEO + CFO	Volatility	OG Proportion	[0.0675 0.0127]	0.0020
			ELC Proportion	[0.0747 0.0116]	0.0048
			SG Proportion	[0.483 0.111]	0.0125
	Value at Risk	Value at Risk	OG Proportion	[0.421 0.0948]	0.0032
			ELC Proportion	[0.476 0.0819]	0.0064
			SG Proportion	[0.0772 0.0177]	0.0109
			OG Proportion	[0.0674 0.0146]	0.0026
			ELC Proportion	[0.0762 0.0133]	0.0058
			SG Proportion		

Table 1-regression results for SPINDEX4040 Risk =  $\theta_0 + \theta_1 \times (\text{Equity Linked Compensation Proportions})$

Despite my initial hypothesis, I did not find any significant relation between U.S. real estate firms satisfying SPINDEX 4040 risk measured as volatility and value at risk and the value of equity-linked compensation for the period of 2006 to 2012. No distinct trend or pattern was visible with a coefficient of determination of, at most, 0.0125.

Figure 1 below demonstrates a sample of the above result as shown in a scatterplot. Figure 1- SPINDEX



4040 : CEO+CFO ELC vs. Volatility and Value at Risk

Figure 1 illustrates the scatterplot of equity-linked compensation proportion values for both CEOs and CFOs on one side and firm risk on the other. There's no significant relation between ELC components and risk in REITS based on the framework used in this research. The scatterplot also shows that in REITS stock awards are used more frequently than option awards.

**S5REITS: 2006-2012**

The summary of the result of my data analysis for S5RETS index is as follows.

Index	Executive	Output variable	Regressors	[beta0 beta1]	R^2
S5REITS	CEO	Volatility	SG Proportion	[0.506 0.210]	0.051
			OG Proportion	[0.39 0.1165]	0.011
			ELC Proportion	[0.4936 0.1281]	0.018
		Value at Risk	SG Proportion	[0.081 0.0329]	0.041
			OG Proportion	[0.063 -0.019]	0.01033
			ELC Proportion	[0.078 0.019]	0.01367
	CFO	Volatility	SG Proportion	[0.48 0.18]	0.0264
			OG Proportion	[0.39 0.151]	0.0106
			ELC Proportion	[0.47 0.103]	0.0078
		Value at Risk	SG Proportion	[0.075 0.022]	0.0128
			OG Proportion	[0.063 -0.022]	0.007
			ELC Proportion	[0.072 0.01]	0.0025
	CEO & CFO	Volatility	SG Proportion	[0.466 0.18]	0.0316
			OG Proportion	[0.39 0.0938]	0.005
			ELC Proportion	[0.4826 0.1275]	0.0154
		Value at Risk	SG Proportion	[0.077 0.0274]	0.0232
OG Proportion			[0.062 0.0179]	0.0059	
ELC Proportion			[0.076 0.0171]	0.0089	
CEO + CFO	Volatility	SG Proportion	[0.514 0.234]	0.051	
		OG Proportion	[0.381 0.146]	0.0147	
		ELC Proportion	[0.487 0.128]	0.015	
	Value at Risk	SG Proportion	[0.082 0.036]	0.038	
		OG Proportion	[0.061 0.026]	0.014	
		ELC Proportion	[0.076 0.017]	0.008	

Table 2-regression results for S5REITS- Risk =  $\beta_0 + \beta_1 \times (\text{Equity Linked Compensation Proportions})$

When I tested the framework for S5REITS firms, the relation became less although still, insignificant. For example, CEO Stock grant versus volatility and value at risk returned coefficient of determination of 0.05 which is higher than the values calculated for all SPINDEX4040 firms, but still insignificant. Figure 2 below demonstrates proportions of executive compensation versus firm risk measures. Because there are fewer firms in S5REITS and as a result, fewer observations, data points are more visible.

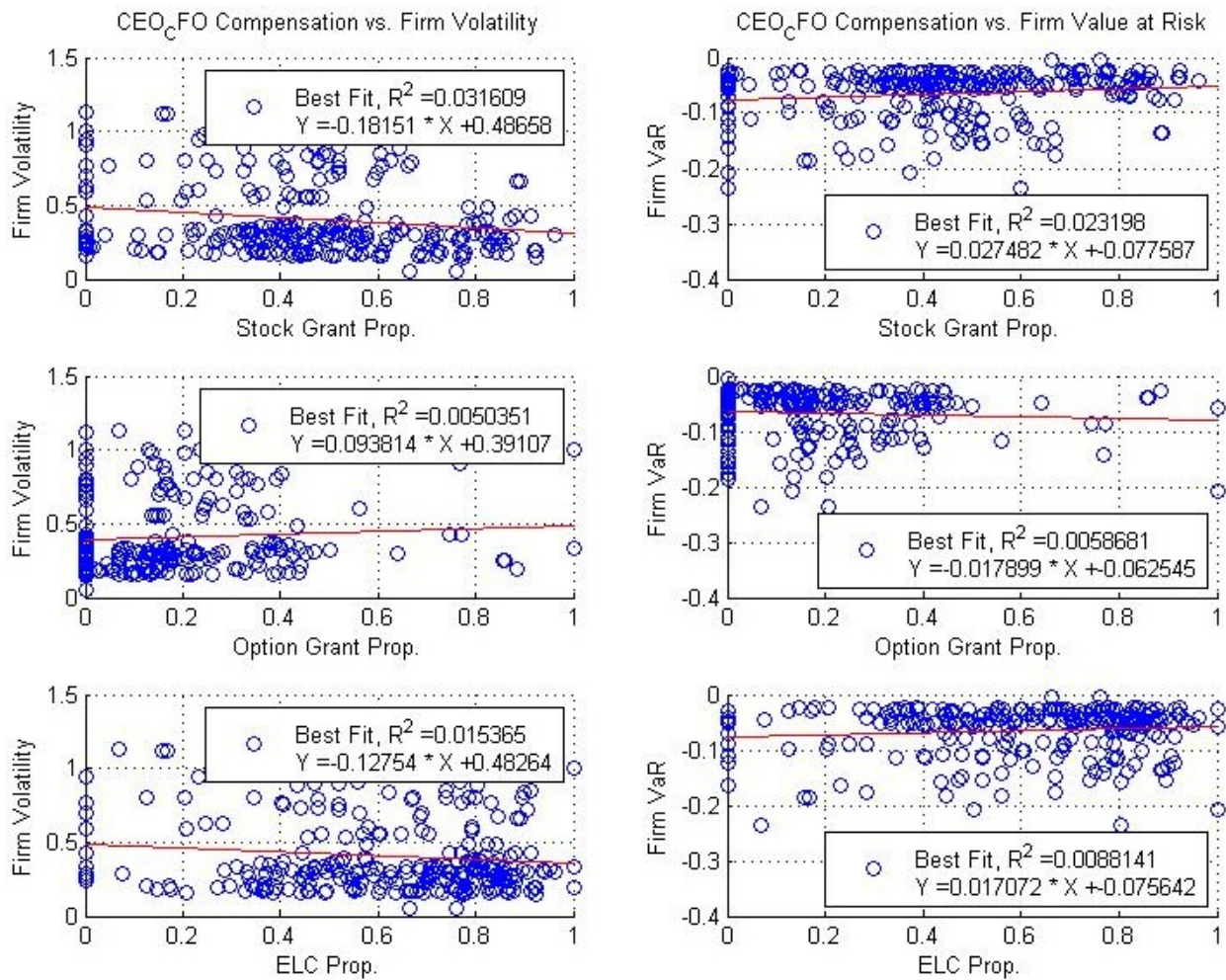


Figure 2 - S5REITS: CEO\_CFO ELC vs. Volatility and Value at Risk

The coefficient of determinations are low, at most 0.03, and the regressed lines are almost flat, indicating no significant relation between stock grants, option grants or sum of the two versus firm risk measured by annual standard deviation and 99 percent value at risk.

## Multilinear regressions

I expected that examining both stock grants and option grants predicting capacity on firm risk would give new perspective as stock grants and option grants are different from risk-taking perspective.

Index	Executive	Output variable	Regressors	[beta0 beta1 beta2]	R <sup>2</sup>
SPINDEX 4040	CEO	Volatility	SG OG	[0.4672 -0.0906 0.0491]	0.0128
		Value at Risk	SG OG	[-0.0749 0.0147 -0.0064]	0.0109
	CFO	Volatility	SG OG	[0.4688 -0.0932 0.0216]	0.0090
		Value at Risk	SG OG	[-0.0749 0.0148 -0.0032]	0.0077
	CEO & CFO	Volatility	SG OG	[0.4672 -0.0906 0.0365]	0.0107
		Value at Risk	SG OG	[-0.0749 0.0146 -0.0047]	0.0092
	CEO + CFO	Volatility	SG OG	[0.4767 -0.1042 0.0351]	0.0129
		Value at Risk	SG OG	[-0.0763 0.0168 -0.005]	0.0113

Table 3-Multilinear regression results for SPINDEX4040- Risk =  $\beta_0 + \beta_1 \times (SG Prop) + \beta_2 \times (OG Prop)$

Index	Executive	Output variable	Regressors	[beta0 beta1 beta2]	R <sup>2</sup>
S5REITS	CEO	Volatility	SG OG	[0.5017 -0.2062 0.0118]	0.0515
		Value at Risk	SG OG	[-0.0798 0.0317 -0.0034]	0.0413
	CFO	Volatility	SG OG	[0.4711 -0.1619 0.0567]	0.0277
		Value at Risk	SG OG	[-0.0723 0.0183 -0.0113]	0.0144
	CEO & CFO	Volatility	SG OG	[0.4863 -0.1813 0.0008]	0.0316
		Value at Risk	SG OG	[-0.0763 0.0261 -0.0045]	0.0235
	CEO + CFO	Volatility	SG OG	[0.5018 -0.2215 0.0367]	0.0516
		Value at Risk	SG OG	[-0.0785 0.0322 -0.0097]	0.0393

Table 4 Multilinear regression results for S5REITS - Risk =  $\beta_0 + \beta_1 \times (SG Prop) + \beta_2 \times (OG Prop)$

Regression results in tables above indicate no significant relation between compensation and risk. Coefficients of determinations are low (at most 0.05) and lines are almost flat.

The graph below shows the correlation between value at risk and components of ELC, It's obvious that there's no observable pattern between S5REITS firms ELC and value at risk.

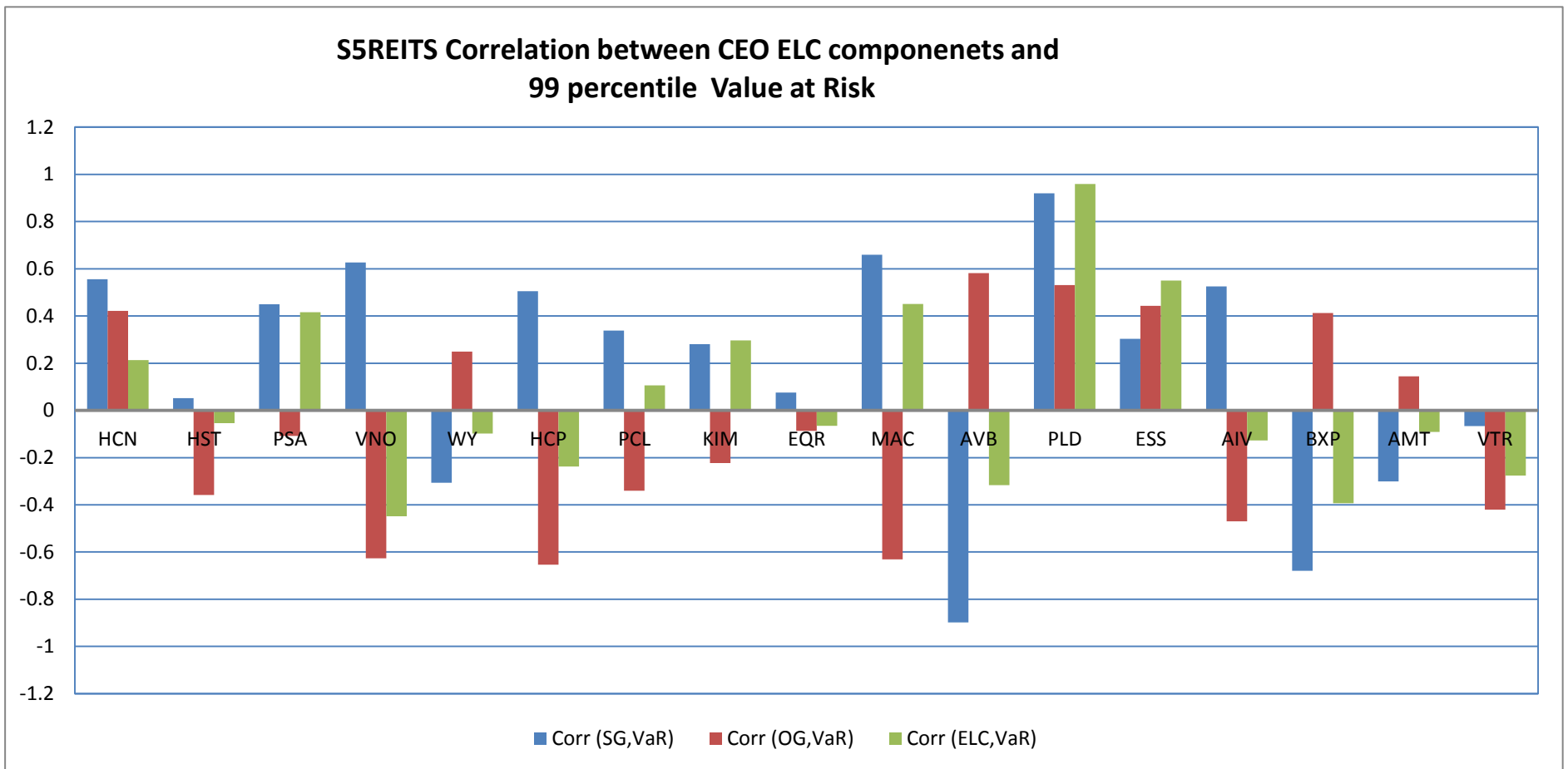
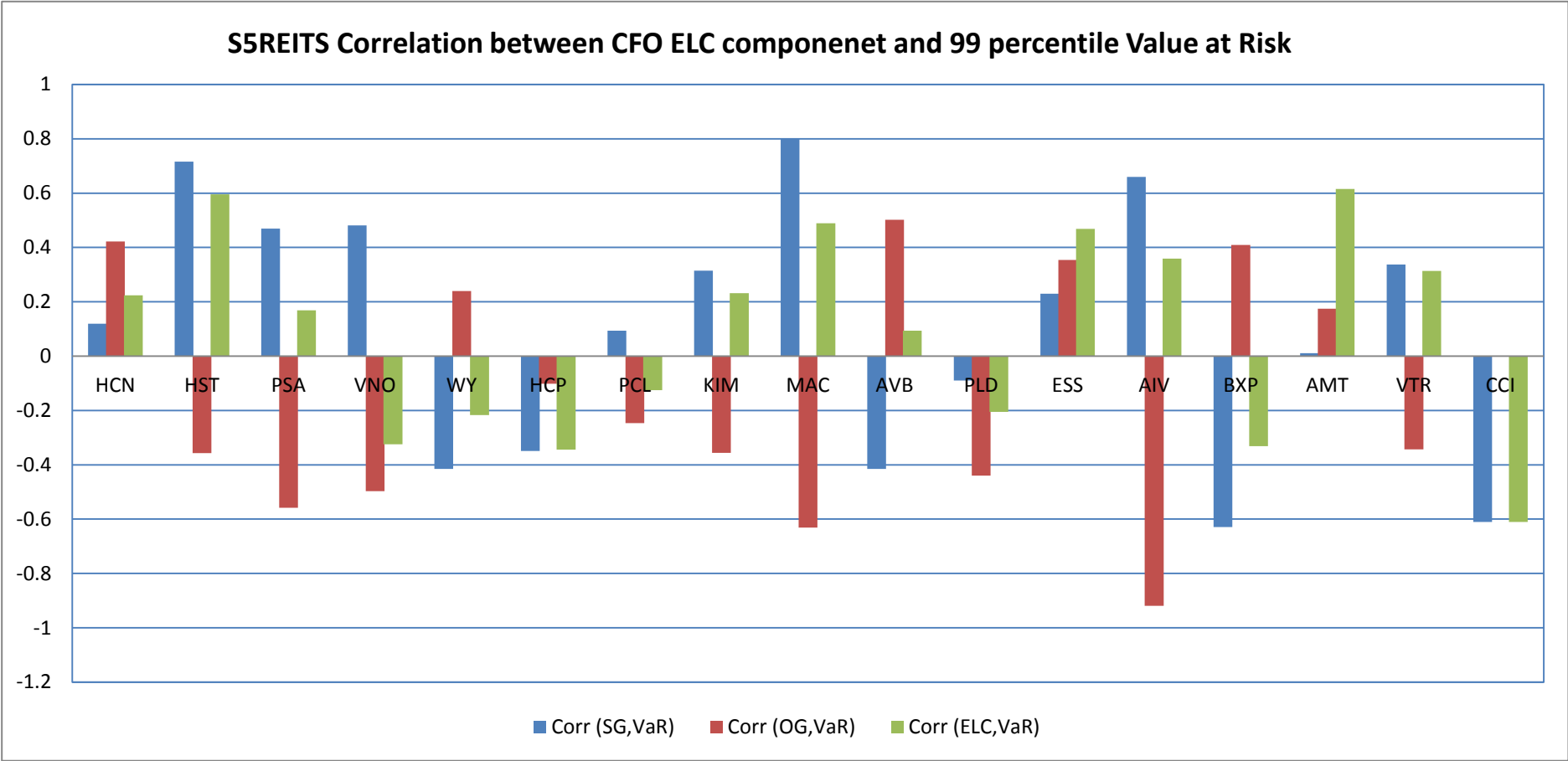


Figure 3 S5REITS firms CEO VaR & ELC correlation

Just like CEO compensation, no pattern can be observed between CFO ELC components and the firm's value at risk





Count	Ticker	CEO SG	CEO OG	CEO ELC	CFO SG	CFO OG	CFO ELC
1	HCN	0.662341	0	0.662341	0.533896	0	0.533896
2	HST	0.660252	0.05055	0.710801	0.6582	0.04911	0.70731
3	PSA	0.109413	0.134937	0.24435	0.278631	0.192969	0.4716
4	VNO	0.481069	0.401225	0.882295	0.346631	0.268532	0.615162
5	WY	0.439669	0.058491	0.49816	0.283417	0.041406	0.324823
6	HCP	0.645311	0.217653	0.862964	0.432196	0.1318	0.563996
7	PCL	0.421857	0.193767	0.615624	0.364373	0.151358	0.515731
8	KIM	0.23402	0.334997	0.569017	0.161482	0.29601	0.457492
9	GGP	0.412929	0.256887	0.669816	0.389121	0.393048	0.782169
10	EQR	0.350048	0.388558	0.738606	0.194088	0.35152	0.545608
11	SPG	0.500252	0.05957	0.559821	0.50409	0.04707	0.55116
12	MAC	0.48283	0.01963	0.50246	0.428375	0.029079	0.457454
13	AVB	0.491155	0.215517	0.706672	0.466899	0.191222	0.658121
14	PLD	0.275235	0.143975	0.41921	0.372247	0.095462	0.467709
15	ESS	0.205461	0.061556	0.267017	0.305734	0.040729	0.346463
16	AIV	0.2426	0.576542	0.819141	0.489902	0.069107	0.559009
17	BXP	0.553975	0.018347	0.572322	0.403433	0.009913	0.413346
18	AMT	0.358234	0.431577	0.789811	0.318945	0.395875	0.714819
19	VTR	0.551895	0.244001	0.795896	0.521872	0.224591	0.746463
20	CCI	0.81269	0.043411	0.856101	0.775464	0.036535	0.811999

Average ELC compensation values for each of the S5REITS firms (2006-2012)

Equity based compensation comprise a high proportion of executive compensation in REIT industry. On average for CEOs in S5REITS firms, the percentage for stock grants, option grants and ELC grants are 44%, 20% and 63% of total compensation. For CFOs these values are 41%, 15% and 56%. These figures show that top REIT firms heavily rely on equity linked compensation for their executives.

For 15 companies out of 20, the CEO compensation ratios are higher than those of CFOs. This contrasts Venema's (2013) finding in US investment banks where CEOs are typically awarded a higher proportion of option grants while CFOs are awarded a higher proportion of stock awards.

## 5. Conclusion

To summarize the result of this dissertation, based on the framework that I used, contrary to my expectation I didn't observe any significant relation between firm risk and executive compensation in REITS. This supplements the result of Griffith, Najand, and Weeks (2011) who could not establish a link between risk and bonuses in REITS although they find a positive link between CEO salary and REITS risk. My result also contradicts Pennathur, Gilley, and Shelor (2005) who established a positive link between option awards and REITS return volatility. The different result in this paper could be due to the different period studied in this paper. When the number of the firms evaluated is narrowed down to 20 firms in S5REIT, the relation becomes less, although still, insignificant. This result is particularly interesting for option grants. As mentioned earlier, option grants are introduced to give managers incentive to take more risk. It could be that the effect is cancelled out by the amount of stock options offered to managers.

In S5REITS, in 16 out of 20 listed firms, compared to CFOs, higher proportion of CEO's compensation comes from equity linked compensation. Same goes with ELC components, stock grants and option grants. This is different from other industries.

### Future Research

Controlling for different contributors of ELC is one of the areas that can be addressed. The question would be, if compensation of executives are heavily weighted on the option grants, will there still be no significant relation between ELC and option grants? Further research could also take into account other factors not included in this research. Differentiating between different segments of real estate industry and examining risk and ELC would be one possibility. Also, structure of the research could take into account other contributors of salary into account. Other factors that can affect the relation between ELC and risk behaviour of the firm include, firm size, CEO/CFO power (tenure, risk, interlock relationship and ownership), institutional ownership, firm performance, etc.

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## **Appendices**

## APPENDIX A : MATLAB Codes:

### To calculate and write Volatility and Value at risk for each firm

```
% script to call the function that fills up the WRDS companies' volatility
% and VaR99
clc
%clear all

xlsFilename = 'S5REITFinal';
CEO_CFO = 'CEO_CFO';
CEOpplusCFO = 'CEO+CFO';
CEO = 'CEO';
CFO = 'CFO';

VolVarWriter( xlsFilename, CEO_CFO);
VolVarWriter( xlsFilename, CEOplusCFO);
VolVarWriter( xlsFilename, CEO);
VolVarWriter( xlsFilename, CFO);

function VolVarWriter( xlsFileName, sheet)

% Reads the year and ticker from the spreadsheet obtained from WRDS
% Calculates annual volatility and historical VaR99
% inputs:
%   inputRange : Range of ticker and year in wrds spreadsheet
%   volRange : the range that volatility values should be written to
%   var99Range: the range that var99 values should be written to
xlsAddress =
strcat('C:\Users\hnaderik\Dropbox\REIT\Data\Final\',xlsFileName, '.xlsx');
[num] = xlsread(xlsAddress, sheet, 'B:B');
lastRow = num2str(size(num,1)+1);
inputRange = strcat('B2', ':C', lastRow);

[yr, tckrs, raw]=xlsread(xlsAddress, sheet, inputRange);

%ticker = unique(txt, 'stable');
%yearS = unique(yr, 'stable');

stocks_Vol = NaN(size(raw,1),1);
HistVaR99 = NaN(size(raw,1),1);

for idx = 1 : size(raw,1)
```

```

Beginning_Date = strcat('0101',num2str(raw{idx,1}));
End_Date = strcat('0101', num2str(raw{idx,1} + 1));

stocks =
hist_stock_data(Beginning_Date,End_Date,raw{idx,2},'frequency','d');

if isempty(stocks)
    stocks_Vol(idx)=NaN;
else
    Prices=stocks.AdjClose;
    Returns=Prices(1:end-1)./Prices(2:end)-1;
    stocks_Vol(idx)=sqrt(260)*std>Returns);
    HistVaR99(idx) = computeHistoricalVaR>Returns, .99,0);

end
end

[dummy,xlsHeader] = xlsread(xlsAddress,sheet,'A1:Z1');
VolColumnNo = find(strncmp('Annual Vol',xlsHeader,20));
if isempty(VolColumnNo)
    error('volatility column not found, exiting...')
else
    volCol = char('A'+ (VolColumnNo - 1));
    volRange = strcat(volCol,'2:',volCol,lastRow);
    var99Range = strcat(volCol+1,'2:',volCol+1,lastRow);

    xlswrite(xlsAddress,stocks_Vol,sheet,volRange);
    xlswrite(xlsAddress,HistVaR99,sheet,var99Range);
end

end

```

## To model Volatility and Value at Risk and ELC components

```
% script to call the function that fills up the WRDS companies volatility
% and VaR99
%clc
%clear all

xlsFilename1 = '4040Final';
xlsFilename2 = 'S5REITFinal';

DataSetName1 = 'SINDEX 4040_';
DataSetName2 = 'S5REIT_';

CEO_CFO = 'CEO_CFO';
CEOplusCFO = 'CEO+CFO';
CEO = 'CEO';
CFO = 'CFO';

% newModeling( xlsFilename1, CEOplusCFO,DataSetName1);
% newModeling( xlsFilename1, CEO_CFO,DataSetName1);
% newModeling( xlsFilename1, CEO,DataSetName1);
% newModeling( xlsFilename1, CFO,DataSetName1);

newModeling( xlsFilename2, CEOplusCFO,DataSetName2);
newModeling( xlsFilename2, CEO_CFO,DataSetName2);
newModeling( xlsFilename2, CEO,DataSetName2);
newModeling( xlsFilename2, CFO,DataSetName2);

function newModeling(xlsFileName, sheet, DataSetName)

%xlsAddress =
strcat('C:\Users\hnaderik\Dropbox\REIT\Data\Final\',xlsFileName, '.xlsx');
xlsAddress =
strcat('C:\Users\HoNad\Dropbox\REIT\Data\Final\',xlsFileName, '.xlsx');

%find the input range in data sheet
[dummy,xlsHeader] = xlsread(xlsAddress,sheet,'A1:Z1');
[num] = xlsread(xlsAddress,sheet,'B:B');
lastRow = num2str(size(num,1)+1);

SGcolumnNo = find(strncmp('SG Prop',xlsHeader,20));
if isempty(SGcolumnNo)
    error('SG Prop column not found, exiting...')
else
    SGcol = char('A'+ (SGcolumnNo - 1));
```



```

inputRange =
xlsread(xlsAddress, sheet, strcat(SGcol, '2:', SGcol+4, lastRow));

SGrange = inputRange(:,1);
OGrange = inputRange(:,2);
ELCrange = inputRange(:,3);
VOLrange = inputRange(:,4);
VARrange = inputRange(:,5);

%   OGnotZero = find(OGrange~=0);
%   OGrangeNonZero = OGrange(OGnotZero);
%   VOLrangeNonZeroOG = VOLrange(OGnotZero);
%   VARrangeNonZeroOG = VARrange(OGnotZero);

end

% Regress executive compensation proportion data on FirmVol

SGstatsVOL=regstats(VOLrange,SGrange,'linear');
OGstatsVOL=regstats(VOLrange,OGrange,'linear');
ELCstatsVOL=regstats(VOLrange,ELCrange,'linear');
%OGnonZeroStatsVOL =
regstats(OGrangeNonZero,VOLrangeNonZeroOG,'purequadratic');

% Regress executive compensation proportion data on FirmVar
SGstatsVAR=regstats(VARrange,SGrange,'linear');
OGstatsVAR=regstats(VARrange,OGrange,'linear');
ELCstatsVAR=regstats(VARrange,ELCrange,'linear');
% OGnonZeroStatsVAR =
regstats(OGrangeNonZero,VARrangeNonZeroOG,'purequadratic');

% DISPLAY fit
% CEO & CFO sample Vol:
rSquareSGvol = SGstatsVOL.rsquare;
rSquareOGvol = OGstatsVOL.rsquare;
rSquareELCvol = ELCstatsVOL.rsquare;
%rSquareNonZeroOGvol = OGnonZeroStatsVOL.rsquare;

% CEO & CFO sample VaR:
rSquareSGvar = SGstatsVAR.rsquare;
rSquareOGvar = OGstatsVAR.rsquare;
rSquareELCvar = ELCstatsVAR.rsquare;
% rSquareNonZeroOGvar = OGnonZeroStatsVAR.rsquare;

```

```

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% PLOTTING regressions:
%VOL

% Plot SG regression vs. Volatility
set(figure,'name',strcat(DataSetName,' ', sheet),'numbertitle','off')
subplot(3,2,1), scatter(SGrange,VOLrange);
hold on;
title(strcat(sheet,' Compensation vs. Firm Volatility'))

h1 = lsline;
set(h1,'color','r');

%legend(strcat('Best Fit, ', ' R^2 = ',num2str(rSquareSGvol)))

line1 = strcat('Best Fit, ', ' R^2 = ',num2str(rSquareSGvol));
line2 = strcat('Y = ', num2str(SGstatsVOL.beta(2)) , ' * X +
',num2str(SGstatsVOL.beta(1)));
legend( sprintf( '%s\n%s', line1, line2 ) )

xlabel('Stock Grant Prop.')
ylabel('Firm Volatility')
grid on

% %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Plot OG regression vs. volatility
subplot(3,2,3), scatter(OGrange,VOLrange);
% title(strcat(sheet,' Sample: Option Grant Proportion vs. Firm Volatility'))
h2 = lsline;
set(h2,'color','r');

line1 = strcat('Best Fit, ', ' R^2 = ',num2str(rSquareOGvol));
line2 = strcat('Y = ', num2str(OGstatsVOL.beta(2)) , ' * X +
',num2str(OGstatsVOL.beta(1)));
legend( sprintf( '%s\n%s', line1, line2 ) )

xlabel('Option Grant Prop.')
ylabel('Firm Volatility')

grid on

% Plot ELC regression vs. volatility
subplot(3,2,5), scatter(ELCrange,VOLrange);
%title(strcat(sheet,'Sample: ELC Proportion vs. Firm Volatility'))
h3 = lsline;
set(h3,'color','r')
line1 = strcat('Best Fit, ', ' R^2 = ',num2str(rSquareELCvol));

```

```

line2 = strcat('Y = ', num2str(ELCstatsVOL.beta(2)) , ' * X +
',num2str(ELCstatsVOL.beta(1)));
legend( sprintf( '%s\n%s', line1, line2 ) )

xlabel('ELC Prop.')
ylabel('Firm Volatility')
grid on

% VaR
% Plot SG regression vs. Value at Risk
% set(figure,'name',strcat(DataSetName,' ', sheet),'numbertitle','off')

subplot(3,2,2), scatter(SGrange,VARrange);
title(strcat(sheet,' Compensation vs. Firm Value at Risk'))
h4 = lsline;
set(h4,'color','r')
line1 = strcat('Best Fit, ', ' R^2 = ', num2str(rSquareSGvar));
line2 = strcat('Y = ', num2str(SGstatsVAR.beta(2)) , ' * X +
',num2str(SGstatsVAR.beta(1)));
legend( sprintf( '%s\n%s', line1, line2 ), 'Location','SouthEast')

%legend(strcat('Best Fit, ', ' R^2 =
',num2str(rSquareSGvar)), 'Location','NorthWest')
xlabel('Stock Grant Prop.')
ylabel('Firm VaR')
grid on

% Plot OG regression vs. Value at Risk
subplot(3,2,4), scatter(OGrange,VARrange);
%title(strcat(sheet,' Sample: Option Grant Proportion vs. Firm Value at
Risk'))
h5 = lsline;
set(h5,'color','r')
line1 = strcat('Best Fit, ', ' R^2 = ', num2str(rSquareOGvar));
line2 = strcat('Y = ', num2str(OGstatsVAR.beta(2)) , ' * X +
',num2str(OGstatsVAR.beta(1)));
legend( sprintf( '%s\n%s', line1, line2 ), 'Location','SouthEast')

% legend(strcat('Best Fit, ', ' R^2 =
',num2str(rSquareOGvar)), 'Location','NorthWest')
xlabel('Option Grant Prop.')
ylabel('Firm VaR')
grid on

% Plot ELC regression vs. Value at Risk
subplot(3,2,6), scatter(ELCrange,VARrange);
h6 = lsline;

```

```

set(h6,'color','r')
line1 = strcat('Best Fit, ',' R^2 = ',num2str(rSquareELCvar));
line2 = strcat('Y = ', num2str(ELCstatsVAR.beta(2)) , ' * X +
',num2str(ELCstatsVAR.beta(1)));
legend( sprintf( '%s\n%s', line1, line2 ), 'Location','SouthEast')

%title(strcat(sheet,'Sample: ELC Proportion vs. Firm Value at Risk'))
%legend(strcat('Best Fit, ',' R^2 =
',num2str(rSquareELCvar)), 'Location','NorthWest')
xlabel('ELC Prop.')
ylabel('Firm VaR')

grid on

end

```

## Multilinear regressions

```

function RiskvsELCmodeling(xlsFileName, sheet, DataSetName)

%xlsAddress =
strcat('C:\Users\hnaderik\Dropbox\REIT\Data\Final\',xlsFileName, '.xlsx');
xlsAddress =
strcat('C:\Users\HoNad\Dropbox\REIT\Data\Final\',xlsFileName, '.xlsx');

%find the input range in data sheet
[dummy,xlsHeader] = xlsread(xlsAddress,sheet,'A1:Z1');
[num] = xlsread(xlsAddress,sheet,'B:B');
lastRow = num2str(size(num,1)+1);

SGcolumnNo = find(strncmp('SG Prop',xlsHeader,20));
if isempty(SGcolumnNo)
    error('SG Prop column not found, exiting...')
else
    SGcol = char('A'+ (SGcolumnNo - 1));

    inputRange =
xlsread(xlsAddress,sheet, strcat(SGcol, '2:',SGcol+4,lastRow));

    SGrange = inputRange(:,1);
    OGrange = inputRange(:,2);
    ELCrange = inputRange(:,3);
    VOLrange = inputRange(:,4);
    VARrange = inputRange(:,5);
    Xrange = [SGrange OGrange];

```

```
end
```

```
ELCstatsVOL=regstats(VOLrange,Xrange,'linear');
```

```
DataSetName
```

```
sheet
```

```
'VOL'
```

```
ELCstatsVOL.beta
```

```
ELCstatsVOL.rsquare
```

```
% Regress executive compensation proportion data on FirmVar
```

```
ELCstatsVAR=regstats(VARrange,Xrange,'linear');
```

```
DataSetName
```

```
sheet
```

```
'VaR'
```

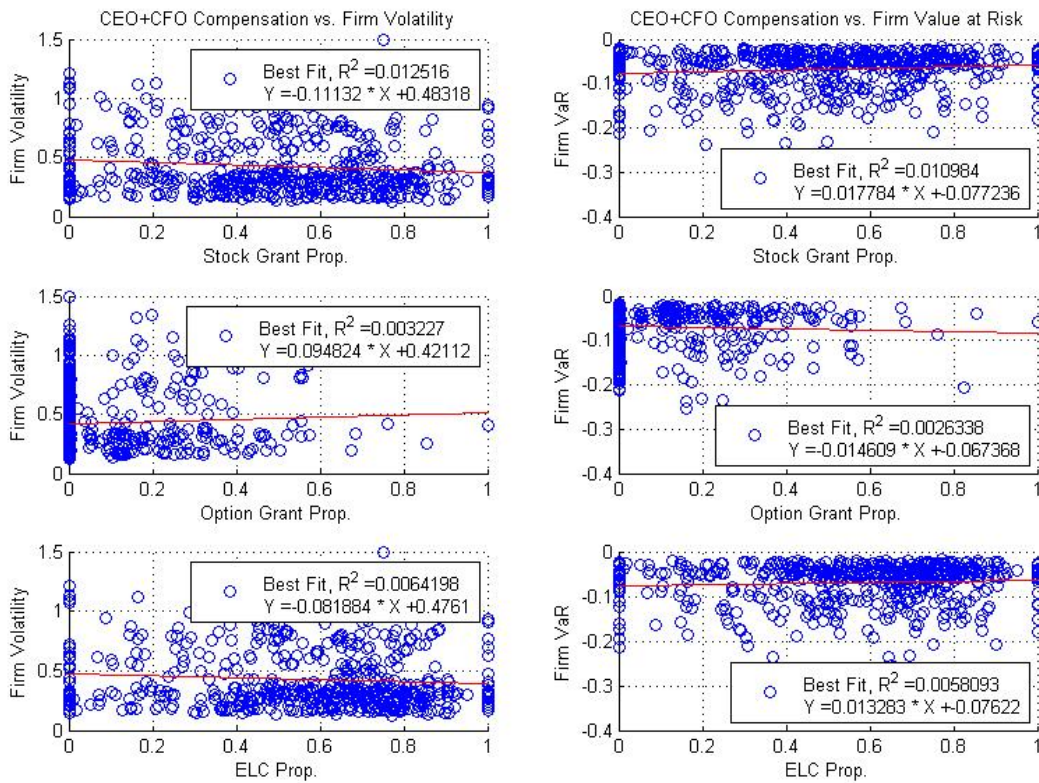
```
ELCstatsVAR.beta
```

```
ELCstatsVAR.rsquare
```

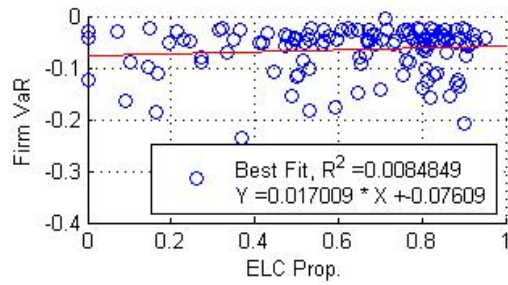
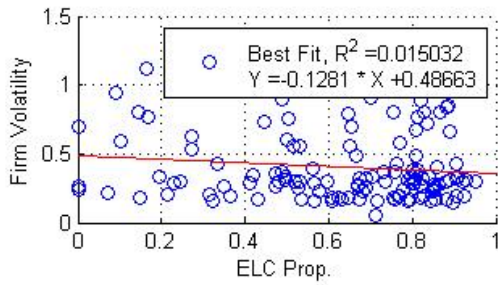
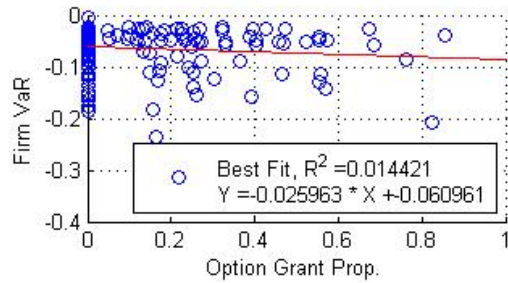
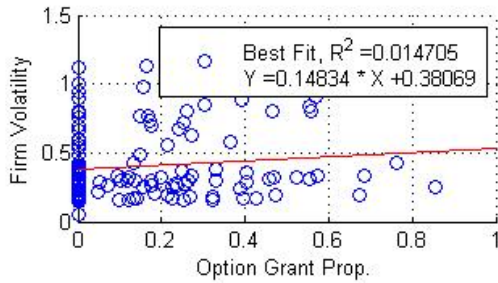
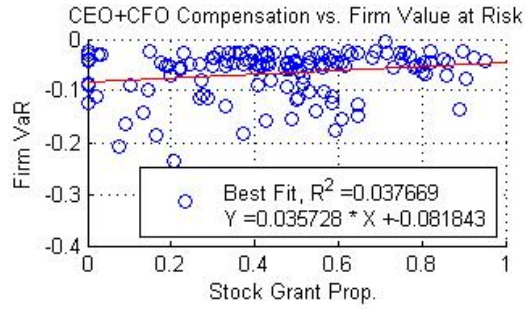
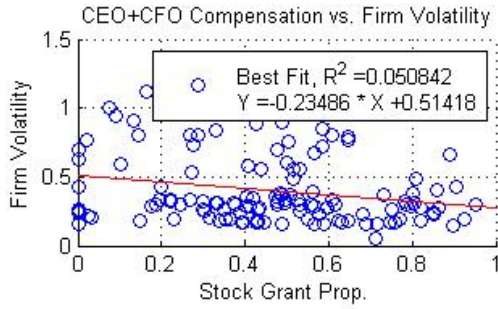
```
end
```

## APPENDIX B: ELC vs. RISK plots and regression results

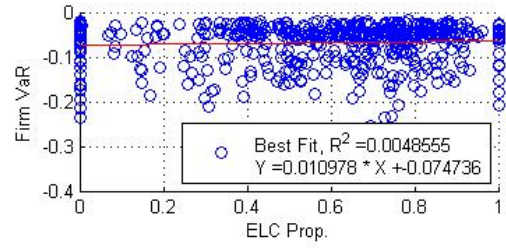
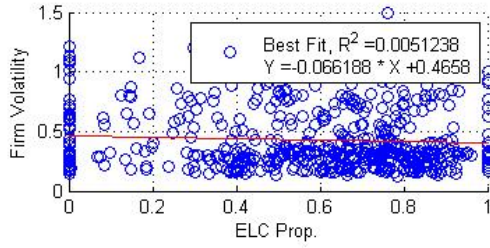
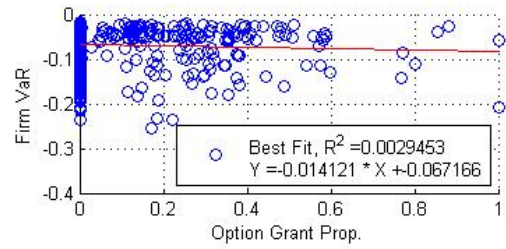
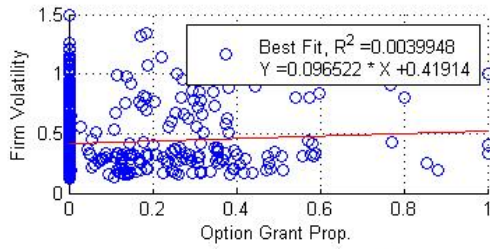
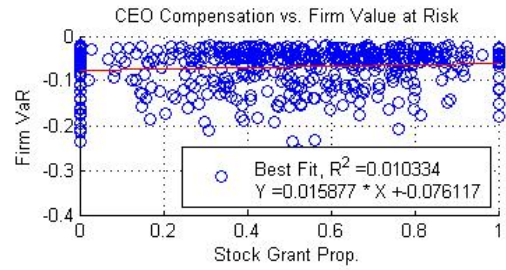
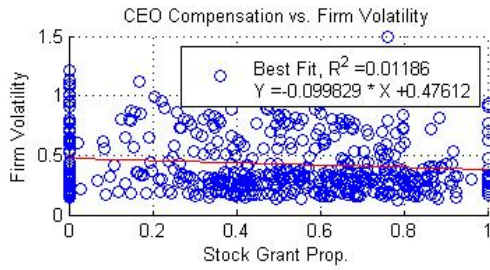
SPINDEX 4040 : CEO+CFO ELC vs. Volatility and Value at Risk



**S5REITS : CEO+CFO ELC vs. Volatility and Value at Risk**

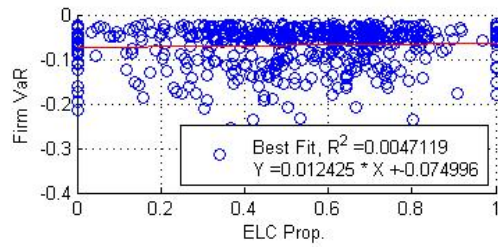
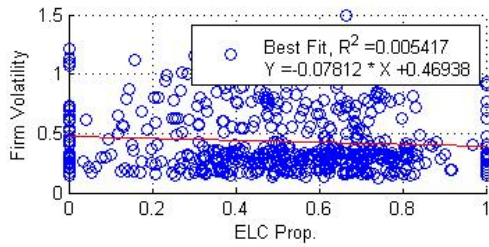
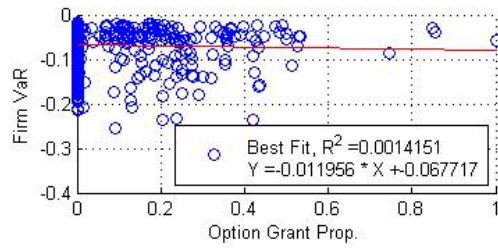
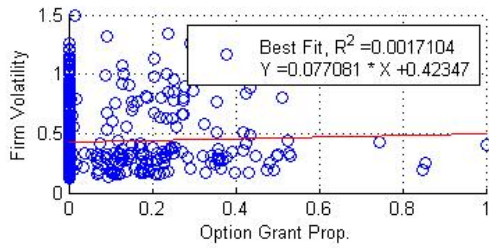
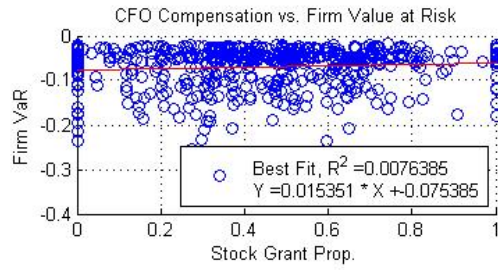
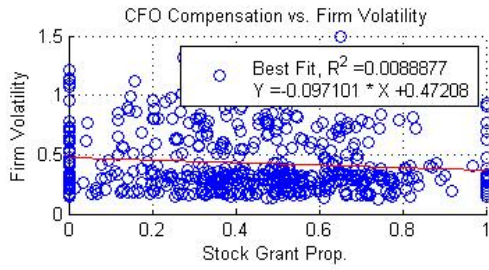


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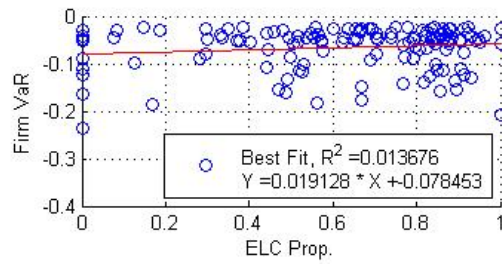
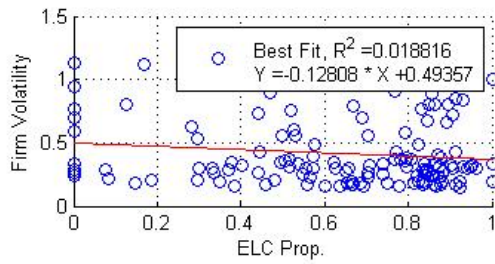
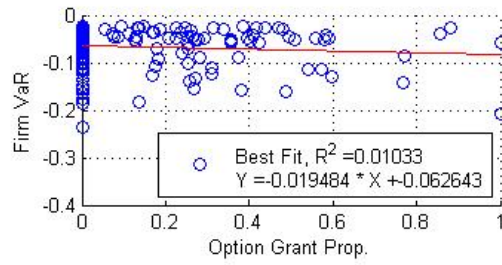
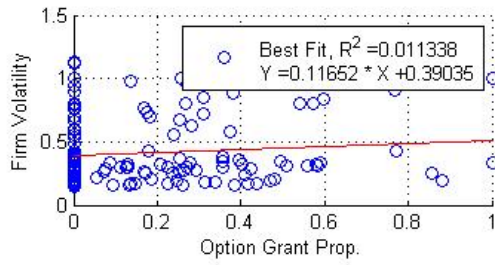
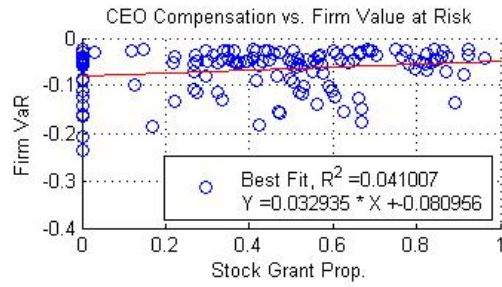
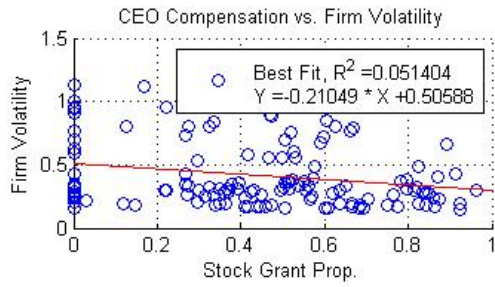




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## S5REITS: CEO vs. Volatility and Value at Risk



**S5RITS: CFO ELC VS. Volatility and Value at Risk**

